In Flight Over Idaho

INEEL Autonomous Unmanned Aerial Vehicle Program

Exploring UAV range, payload, communications and mission operations

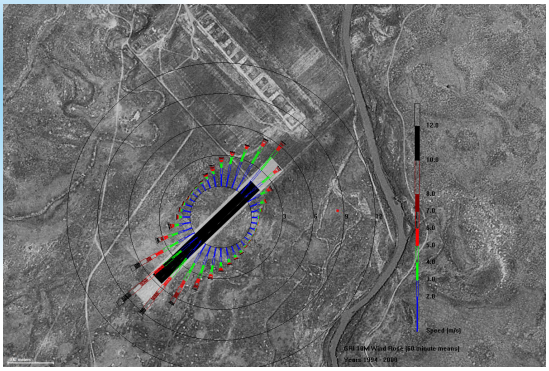
Idaho National Engineering and Environmental Laboratory

INEEL Home of Science and Engineering Solutions

Program Inception

Over the past few years, the INEEL has developed a comprehensive Unmanned Aerial Vehicle (UAV) program. The initial program focus was supporting onsite environmental monitoring efforts, and applying lab research with a vision of utilizing low-cost, autonomous UAVs as intelligent sensor platforms. Fixed wing and small vertical takeoff and landing research continues today from this foundation.

The INEEL program has grown to support other government-related agencies. In July 2003, the INEEL Autonomous Unmanned Aerial Vehicle flight team simultaneously deployed a fleet of small autonomous planes from a common ground station as a proof-of-concept for the Defense Advanced Research Projects Agency (DARPA).



Layout for the UAV airfield in development at the INEEL

This event is believed to be the first ever simultaneous autonomous flight of five UAVs, and has attracted national and international attention.

The INEEL is fielding multi-agent UAVs to broaden missions in ad-hoc self-healing mobile network communications.

Program Description:

The INEEL UAV program includes small, hand-launched systems, unmanned rotorcraft and larger UAV craft. The larger aircraft weigh approximately 55 pounds and can carry payloads up to 20 pounds. A larger payload, combined with longer flight times, enables these aircraft to perform more complex and beneficial missions. The INEEL possesses numerous UAV payload packages and ground-control-supported equipment, and employs a cadre of experienced UAV personnel.

Ongoing Research Efforts:

Focus on operations that include common ground station architecture for multiple fixed wing and vertical take off vehicles, and field demonstrations with multiple agents exhibiting advanced autonomy.

Development of UAV-acquired geo-registered aerial photographs.

Lab directed research effort - UAV wireless communications in conjunction with the INEEL Wireless Communications Test Bed.

- Focus on exploiting existing cellular infrastructures for UAV use
- Integration and deployment of secure, encrypted, bi-directional cellular communications for UAV mission control
- Investigation and integration of nano-cell relay for dynamically extended cell coverage.

Spectrum Authority

The INEEL has also been granted National Telecommunications and Information Administration (NTIA) authority allowing broad experimental test station spectrum authority.

Future Opportunities:

The INEEL is fast becoming an internationally recognized center for UAV excellence, focusing on small, tactical-UAV applications, and operations testing and evaluation for diverse government agencies.

Construction will begin in spring 2004 to build a dedicated support site and runway to enhance the capabilities of the program. This airfield will allow onsite flight-testing and demonstration, and will provide a unique, highly competitive advantage. With the completion of the airfield, we can provide a developed UAV platform, with an integrated airborne sampler/sensor for immediate deployment.

The airfield will also be used for security-related area and perimeter surveillance allowing missions to be flown on a routine basis. This will provide wider site coverage and an increased probability to detect unauthorized intrusion earlier, thus allowing a more effective and timely response. Additionally, an established UAV program/airfield can reduce the need for more expensive, permanently located, manned aircraft (e.g., helicopters).

- Advanced research in a variety of related UAV and associated payload (e.g., aerial imagery sensors or communication packages) topical areas. Such a permanent and dedicated UAV airfield will allow onsite flight-testing and demonstration that must now be conducted at remote or out-of-state military airfields for larger UAV assets.
- With its access-controlled boundary, high-desert terrain and sparse population, the INEEL is in a unique situation to offer unmanned aerial vehicle and unmanned ground vehicle collaborative operational testing and demonstration.
- Additional work is planned by the INEEL to develop a higher degree of autonomy, communications and vehicle intelligence while flying specific missions.

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